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ABSTRACT

Butler (1980) compared errors representing intrusions and mislocalizations on 3x3 letter displays under pattern-mask versus no-mask conditions and found that pattern masking increased character mislocalization errors (naming a character in the display but not in the target position as being the target) over intrusion errors (naming a character not in the display as being the target). The possibility that pattern masking may increase feature mislocalizations was examined in this study. A small rectangle was superimposed on a field of vertical colored strips and the exposure of each rectangle was terminated by either a pattern mask or a blank exposure field superimposed upon the continuously-present field of strips. Each of 12 subjects received both postexposure conditions in a random order over trials. Significantly more mislocalizations occurred with pattern masking; mislocalizations toward fixation predominated. The tendency for mislocalizations to proceed inward increased significantly with eccentricity, but significantly more so with pattern masking. This study confirmed Butler's observations in a pure localization experiment, and interpreted in consonance with feature perturbation theory. (ABL)

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Direct Measures of Character Mislocalizations with Masked/Unmasked Exposures

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Abstract

The effect of masking upon feature mislocalizations was explored by presenting a small rectangle on a field of colored strips followed by a pattern mask or by a blank field. Subjects were less accurate in judging the strip over which the rectangle lay when the pattern mask was presented, and the tendency for mislocalizations to proceed inward increased with eccentricity more with pattern masking.

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Butler (1980) compared errors representing intrusions and mislocalizations on 3 X 3 letter displays under pattern-mask versus no-mask conditions. He found that pattern masking increases character mislocalization errors (naming a character in the display but not in the target position as being the target) over intrusion errors (naming a character not in the display as being the target), especially when subjects were unsure of the position to be tested before the exposure. Pattern masking thus may increase feature mislocalizations (Wolford, 1975) that would lead to misperceiving a nontarget character as being in the target position.

In the experiment currently reported, a small rectangle was superimposed on a field of vertical colored strips as in the study by Chastain (1986). In that study Chastain found that mislocalizations inward toward fixation predominated, and that this tendency increased with eccentricity. In the present

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experiment figure mislocalizations were examined under both pattern-masking and no-masking (bright postexposure field, to equate for the contrast reduction in the colored strip standards when pattern masking was used) conditions. Butler's (1980) explanation of his findings would be strengthened were the rectangle to be mislocalized more often when displays were pattern masked. A stronger tendency toward inward mislocalizations that increases with eccentricity would help show that response bias when the rectangle was not seen was not responsible for the effect, as it was shown not to be responsible for the mislocalization effects observed by Chastain (1982, 1986).

Method

Subjects

Twelve students served for extra credit in a General Psychology course. Each reported normal or corrected-to-normal acuity.

Apparatus

A three-channel Scientific Prototype tachistoscope, Model N-1000, was equipped with a microswitch to allow subjects to initiate exposures. The channel containing the colored strips was illuminated continuously to 130.0 cd/m^2, while each of the other two channels (one containing the rectangle, the other containing the pattern mask or blank white background) was illuminated to 44.0 cd/m^2.

Stimuli

Colored strips were cut from Ful-Vu E-Z report covers, which are made of transparent colored plastic. Strips extended contiguously to the left and right of fixation, with colors proceeding toward the periphery in the order yellow, blue, red, green. They were mounted over a window cut in a Masonite slide, and were rear-illuminated. Each strip subtended a visual angle of 5.23 deg vertically by .64 deg horizontally. Rectangles and the pattern mask were drawn in black ink from a Pilot Razor point pen on white index cards, which were mounted on Masonite slides for front illumination. The rectangle was shaded solid black and subtended a visual angle of .86 deg vertically and .27 deg horizontally. The pattern mask is shown in Figure 1 (next page), and subtended a visual angle of 1.61 deg vertically and spanned the entire visual field horizontally; stroke width of the pattern was .27 deg, the width of the rectangle. Each rectangle was centered vertically and horizontally to appear on the inside (toward fixation) or outside half of a colored strip. A white card was placed behind the strips with a .05 deg diameter fixation dot centered vertically in the visual field behind the juncture of the two yellow strips.

Experimental Design

Each subject received six blocks of 32 exposures per block. Within each block were 16 pattern-masked and 16 unmasked exposures, with the rectangle appearing in each possible location in each visual field on one exposure per masking condition.

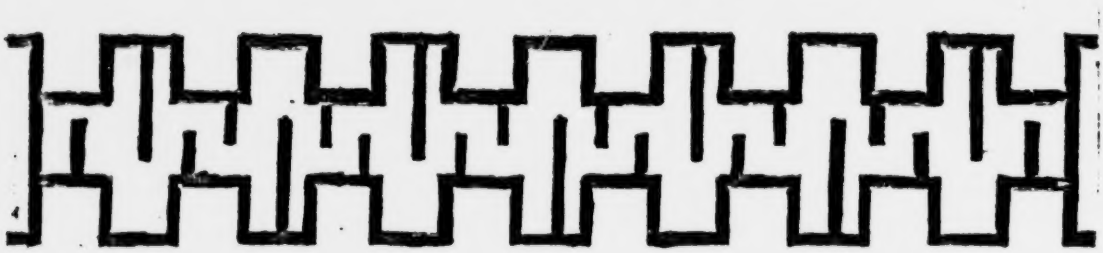

Figure 1. Pattern mask used in the present experiment.

orders were completely randomized within each block, including the masking variable.

Procedure

Each subject was asked initially to name the colors of the strips to ensure that none was color blind. The subject's left eye was patched to prevent double images, since the strips and rectangles were at different distances from the subject. The subject was then familiarized with the possible locations of the rectangle with relation to the strips and was told to designate verbally after each exposure the location of each rectangle as being on the inside or outside half of a particular colored strip. Thus there were eight possible responses. A .2 s tone from the tachistoscope sounded as a ready signal for each trial. The rectangle was illuminated for 100 ms, and the mask or blank slide immediately followed for 500 ms, upon each exposure. The colored strips were illuminated continuously. No practice or feedback was given, and a response was required after each exposure. Trials proceeded in an uninterrupted sequence.

Results

Responses were scored as follows: An error mislocalizing the rectangle inward toward fixation was assigned a +1; a correct localization was assigned a 0; and an error mislocalizing the target outward away from fixation was assigned a -1. Presentations at the innermost and outermost locations in each visual field were not analyzed because only one direction of mislocalization was possible for each of them.

Means for each location within each visual field for each masking condition for each subject were entered into an analysis of variance. Overall, inward mislocalizations predominated, as shown by the significant effect of the grand mean, $F(1, 11) = 16.94$, $p < .01$. The predominance of inward mislocalizations was more apparent with pattern masking, $F(1, 11) = 13.41$, $p < .01$, with a mean score of .185 with pattern masking but only .081 with the blank postexposure field. Means for the significant effect of position, $F(5, 55) = 10.50$, $p < .0001$, the significant interaction between masking condition and position, $F(5, 55) = 7.59$, $p < .0001$, and the significant interaction among visual field, masking condition, and position, $F(5, 55) = 2.51$, $p < .05$, may be derived from the figure at the end of this manuscript. No other main effect or interaction was significant.

Discussion

The prevalence of inward over outward mislocalizations was greater with pattern masking, as was the increase in this prevalence as eccentricity increased. Butler's (1980) interpretation of his results thus received support currently in a pure localization experiment. Pattern masking apparently does increase mislocalizations, and does so in a way that is consistent with Wolford's (1975) feature perturbation theory. Results from Chastain's (1986) study using unmasked presentations were replicated, with the effects shown to be stronger under pattern-masking than unmasked conditions. The fact that mislocalizations with pattern masking increased in a way that is consistent with Wolford's model, and that Chastain's results were

replicated, helps eliminate response bias as a possible explanation.

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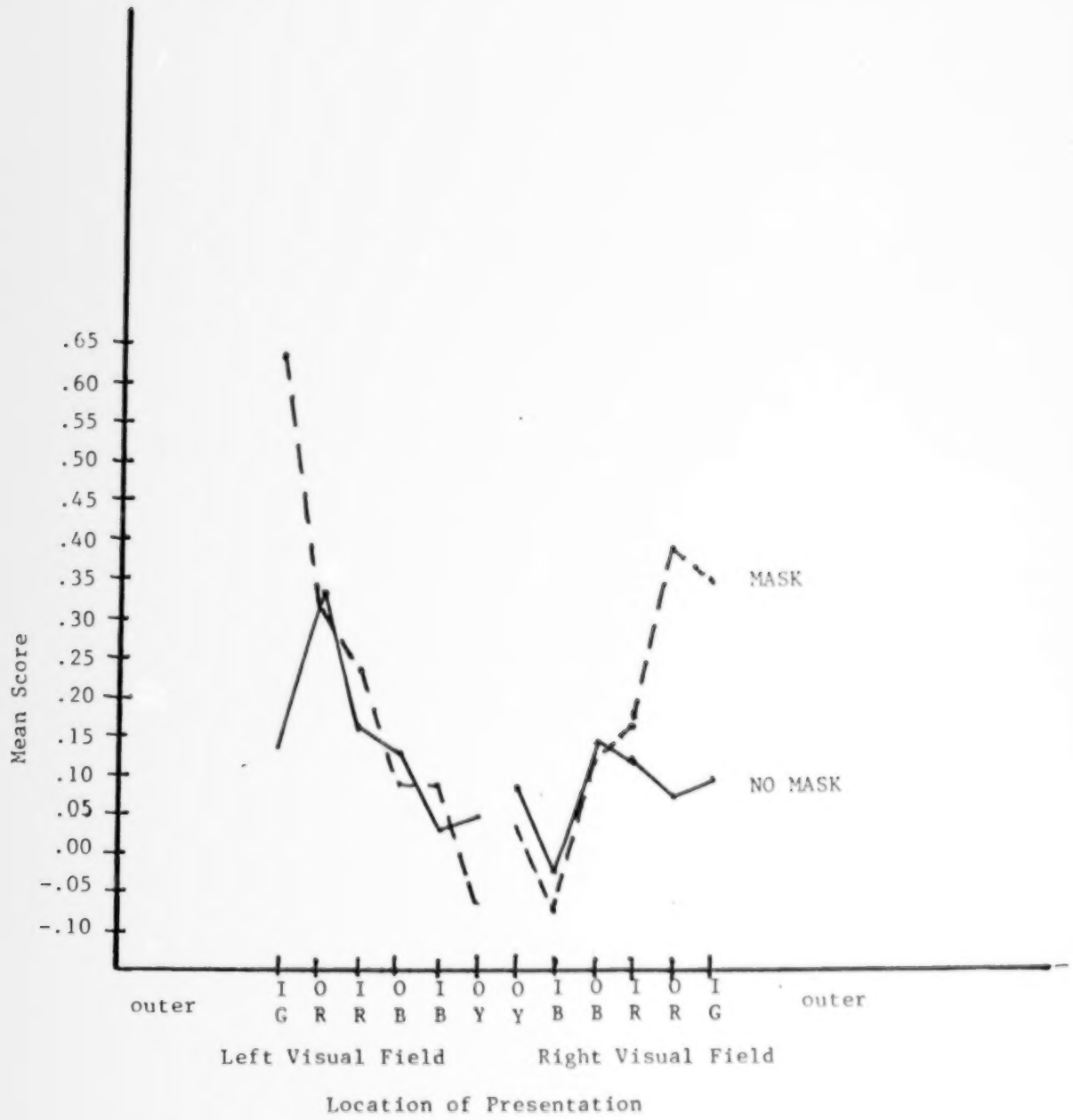

Figure 2. Mean scores for each location in each visual field in each Masking Condition.